2024 Guideline for the Primary Prevention of Stroke:

An AHA Clinical Update

AHA Clinical Update PPTX

A Guideline from the American Heart Association/American Stroke Association

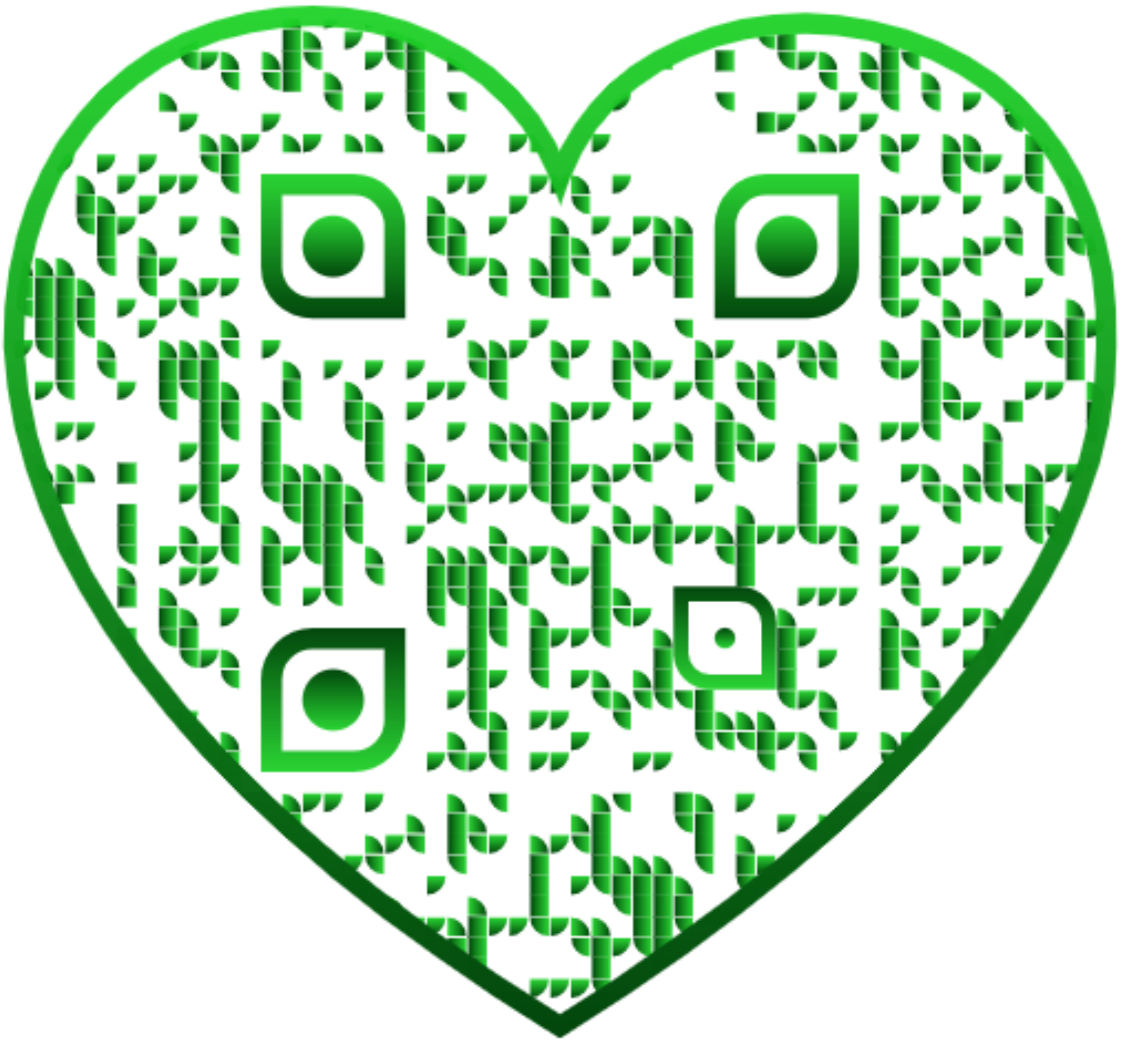

Table 1.
Applying Class of Recommendation and Level of Evidence to Clinical Strategies, Interventions, Treatments, or Diagnostic Testing in Patient Care

CLASS (STRENGTH) OF RECOMMENDATION	
CLASS 1 (STRONG)	**Benefit >>> Risk**
Suggested phrases for writing recommendations: • Is recommended • Is indicated/useful/effective/beneficial • Should be performed/administered/other • Comparative-Effectiveness Phrases†: – Treatment/strategy A is recommended/indicated in preference to treatment B – Treatment A should be chosen over treatment B	
CLASS 2a (MODERATE)	**Benefit >> Risk**
Suggested phrases for writing recommendations: • Is reasonable • Can be useful/effective/beneficial • Comparative-Effectiveness Phrases†: – Treatment/strategy A is probably recommended/indicated in preference to treatment B – It is reasonable to choose treatment A over treatment B	
CLASS 2b (Weak)	**Benefit ≥ Risk**
Suggested phrases for writing recommendations: • May/might be reasonable • May/might be considered • Usefulness/effectiveness is unknown/unclear/uncertain or not well-established	
CLASS 3: No Benefit (MODERATE)	**Benefit = Risk**
Suggested phrases for writing recommendations: • Is not recommended • Is not indicated/useful/effective/beneficial • Should not be performed/administered/other	
CLASS 3: Harm (STRONG)	**Risk > Benefit**
Suggested phrases for writing recommendations: • Potentially harmful • Causes harm • Associated with excess morbidity/mortality • Should not be performed/administered/other	

LEVEL (QUALITY) OF EVIDENCE‡	
LEVEL A	
• High-quality evidence‡ from more than 1 RCT • Meta-analyses of high-quality RCTs • One or more RCTs corroborated by high-quality registry studies	
LEVEL B-R	**(Randomized)**
• Moderate-quality evidence‡ from 1 or more RCTs • Meta-analyses of moderate-quality RCTs	
LEVEL B-NR	**(Nonrandomized)**
• Moderate-quality evidence‡ from 1 or more well-designed, well-executed nonrandomized studies, observational studies, or registry studies • Meta-analyses of such studies	
LEVEL C-LD	**(Limited Data)**
• Randomized or nonrandomized observational or registry studies with limitations of design or execution • Meta-analyses of such studies • Physiological or mechanistic studies in human subjects	
LEVEL C-EO	**(Expert Opinion)**
• Consensus of expert opinion based on clinical experience.	

•COR and LOE are determined independently (any COR may be paired with any LOE).

•A recommendation with LOE C does not imply that the recommendation is weak. Many important clinical questions addressed in guidelines do not lend themselves to clinical trials. Although RCTs are unavailable, there may be a very clear clinical consensus that a particular test or therapy is useful or effective.

•*The outcome or result of the intervention should be specified (an improved clinical outcome or increased diagnostic accuracy or incremental prognostic information).

• †For comparative-effectiveness recommendation (COR 1 and 2a; LOE A and B only), studies that support the use of comparator verbs should involve direct comparisons of the treatments or strategies being evaluated.

•‡The method of assessing quality is evolving, including the application of standardized, widely-used, and preferably validated evidence grading tools; and for systematic reviews, the incorporation of an Evidence Review Committee.

•COR indicates Class of Recommendation; EO, expert opinion; LD, limited data; LOE, Level of Evidence; NR, nonrandomized; R, randomized; and RCT, randomized controlled trial.

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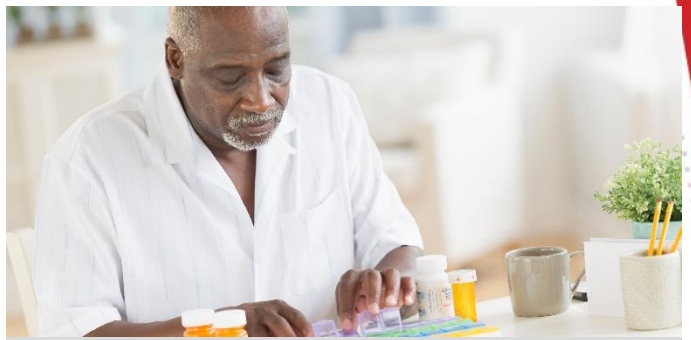
Elements Associated with Elevated Stroke Risk

Adverse Social Determinants of Health

- Poor Access to Care
- Socioeconomic Disadvantage
- Lack of Social and Community Support
- Poor Access to Education
- Racism and Discrimination

Inadequate Management of Common Risk Factors

- Undiagnosed Risk Factors
- Untreated Risk Factors
- Best Practices Not Followed
- Lack of Shared Decision Making
- Health System Barriers
- De-Emphasis of Lifestyle Factors *(Life's Essential 8)*



Commonly Unrecognized Risk-enhancing Factors

- Lipoprotein(a)
- Thrombophilias
- Endometriosis
- Early Menopause
- Complications of Pregnancy

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Closing the Prevention Gap

Prevention Gap: Difference between current and potential control of stroke risk factors in the US.

Factors Affected:

- Lifestyle factors
- Medical factors that can be managed with behavior change and/or medication
- Non-medical factors including health literacy, food security, housing security, and access to medication
- Social determinant of health factors including access to education, access to health insurance, economic stability, neighborhood environment, and social and community context

Importance:

- Represents the opportunity to reduce the burden of stroke on patients, communities, and society
- Presents modifiable factors that allow us to address disparities in stroke risk
- Underscores the imperative for quality improvement and health services research to improve risk factor detection and control

American Heart Association.

Sources of Evidence Used in Prevention Recommendations in this Guideline

Outcome data from research in populations:

- Without CVD
- With CVD but not any Stroke or TIA
- With CVD but ≤50% with history of stroke

Abbreviations: CVD indicates cardiovascular disease; and TIA, transient ischemic attach.

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Social Determinants of Health and Health-Related Social Needs

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Primary Prevention: Screening

COR	RECOMMENDATIONS
1	In persons aged 40-79 years, estimations of risk for CVD every 1-5 years is beneficial to guide decisions on treatments and lifestyle recommendations that may reduce risk for stroke.
1	In persons with AF, calculations of CHA2DS2-VASc score is recommended to guide decisions on prescription of oral anticoagulation to reduce risk for stroke.
1	In persons aged 18 or greater, periodic screening for modifiable behaviors and medical conditions that increase stroke risk is recommended.
1	In persons aged 18 and up, periodic screening for SDoH is beneficial to identify additional factors which contribute to stroke risk.

Abbreviations: CVD indicates cardiovascular disease; and SDoH , social determinants of health.

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Management of Health Behaviors and Health Factors for Primary Prevention of Stroke

Diet Quality	
COR	**RECOMMENDATIONS**
1	In adults without prior CVD and who are at high or intermediate CVD risk, a Mediterranean diet is recommended to reduce the risk of incident stroke.
2a	In adults who are aged 60 years or older and have uncontrolled BP, compared to using 100% sodium chloride, salt substitution is reasonable to reduce the risk of incident stroke.
2b	In adults, folic acid supplementation and B-complex vitamins supplementation for reducing the risk of stroke is not well-established.
3: No Benefit	In adults without prior CVD, long-chain fatty acids are not effective for reducing the risk of stroke.
3: No Benefit	In adults, vitamin C, vitamin E, selenium, antioxidants, calcium, calcium with vitamin D, and multivitamin supplementation are not effective for reducing the risk of stroke.

Abbreviations: BP indicates blood pressure; and CVD, cardiovascular disease.

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Management of Health Behaviors and Health Factors for Primary Prevention of Stroke

Physical Activity	
COR	**RECOMMENDATIONS**
1	In adults, screening for physical activity is recommended to estimate stroke risk.
1	In adults, counseling patients to get at least 150 minutes of moderate intensity or 75 minutes of vigorous intensity physical activity per week is recommended to reduce stroke risk.
1	In adults, counseling to avoid excessive time spent in sedentary behavior is recommended to reduce stroke risk.

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Management of Health Behaviors and Health Factors for Primary Prevention of Stroke

Blood Sugar	
COR	**RECOMMENDATIONS**
1	In asymptomatic adults aged 18 or over, who have overweight, obesity , or ASCVD, screening for diabetes is recommended to inform stroke risk.
1	In patients with diabetes and high CV risk or established CVD, treatment with a GLP-1 receptor agonist is effective to reduce the risk of stroke.
3: No Benefit	In patients with T1D or T2D, intensive glycemic control is not beneficial for stroke prevention.

Abbreviations: ASCVD indicates atherosclerotic cardiovascular disease; CV, cardiovascular; CVD, cardiovascular disease; GLP-1, glucagon-like protein-1; T1D, type 1 diabetes mellitus; and T2D, type 2 diabetes mellitus.

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Management of Health Behaviors and Health Factors for Primary Prevention of Stroke

Weight and Obesity	
COR	**RECOMMENDATIONS**
1	In adults over age 18, screening for overweight and obesity is recommended to inform the risk of stroke.
2b	In patients with Obesity Class II and above, bariatric surgical procedures to promote weight loss may be considered to reduce the risk of stroke.

American Heart Association.

Management of Health Behaviors and Health Factors for Primary Prevention of Stroke

Lipids	
COR	**RECOMMENDATIONS**
1	In adults who qualify for treatment with lipid-lowering therapy according the AHA guidelines, treatment with a statin is recommended to reduce the risk of a first stroke.
2b	Patients without CVD who are treated with lipid-lowering therapy, according to AHA guidelines, who cannot reach goals with statins, the benefit ofalirocumab or evolocumab has not been proven for stroke risk reduction.
2b	In adults who do not tolerate statin therapy and have elevated LDL-C and increased CV risk, treatment bempedoic acid has not been proven to reduce risk of stroke.
3: No Benefit	In adults in moderate or low intake of long chain omega-3 fatty acid is not recommended to reduce the risk of a first stroke.

Abbreviations: AHA indicates the American Heart Association ; CV, cardiovascular; CVD, cardiovascular disease; and LDL-C, low-density lipoprotein cholesterol.

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Management of Health Behaviors and Health Factors for Primary Prevention of Stroke

Blood Pressure	
COR	**RECOMMENDATIONS**
1	In adults aged 18 or over, screening for hypertension is recommended to identify stroke risk and eligibility for treatment.
1	In adults with stage 1 or stage 2 hypertension, lifestyle modification and drug treatment to a BP less than 130/80 is recommended to reduce stroke risk.
1	In adults with HTN, thiazide and thiazide –like diuretics, CCB, ACEI, and ARBs are recommended as initial therapies to reduce stroke risk.
1	In adults with HTN, drug therapy with one or more medications is indicated to reach BP control necessary to prevent stroke.

Abbreviations: ACEI indicates angiotensin converting enzyme inhibitor; ARB, angiotensin receptor blocker; BP, blood pressure; CCB, calcium channel blocker; and HTN, hypertension.

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Management of Health Behaviors and Health Factors for Primary Prevention of Stroke

Tobacco Use / Cessation Intervention	
COR	**RECOMMENDATIONS**
1	For active smokers, cessation medication delivered with behavioral counseling is recommended.
1	For active smokers of cigarettes and other tobacco products assistance with cessation is recommended to reduce the risk of stroke.
2a	For active smokers who are in a hospital setting, cessation medications alongside behavioral counseling is reasonable for smoking cessation.
2b	For active smokers, the long-term health benefits of using e-cigarettes in place of nicotine replacement therapy for smoking cessation is not well-established.

American Heart Association.

Management of Health Behaviors and Health Factors for Primary Prevention of Stroke

Sleep	
COR	**RECOMMENDATIONS**
2b	The effectiveness of screening adults for obstructive sleep apnea to prevent stroke is unclear.
2b	In patients with obstructive sleep apnea, continuous positive airway pressure might be reasonable to reduce the risk of stroke.

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Atherosclerotic and Non-Atherosclerotic Risk Factors:
Asymptomatic Carotid Artery Stenosis

	RECOMMENDATIONS
3: No Benefit	In the asymptomatic population, routine screening for carotid artery stenosis is **not** recommended to reduce the risk of stroke.
1	In patients with asymptomatic carotid artery stenosis **>70%**, shared decision-making between the patient and the health care team to decide between carotid revascularization or medical management is recommended.
2a	In patients with asymptomatic atherosclerotic carotid artery stenosis, medical treatment with **statins** can be beneficial to reduce the risk of stroke.
2b	In patients with asymptomatic atherosclerotic carotid artery stenosis **>70% and low perioperative risk**, the use of carotid revascularization, in addition to intensive medical therapy, may be reasonable to reduce the risk of stroke.
2b	In patients with asymptomatic carotid artery stenosis >50%, **annual carotid duplex ultrasound** might be reasonable to assess progression of disease and subsequent increased risk of stroke.
2b	In patients with asymptomatic atherosclerotic carotid artery stenosis and high perioperative risk, the effectiveness of carid revascularization to reduce stroke risk is not established.

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Atherosclerotic and Non-Atherosclerotic Risk Factors:
Asymptomatic Cerebral Small Vessel Disease

COR	RECOMMENDATIONS
1	In adults with asymptomatic cerebral small vessel disease, including silent infarcts, **assessment and management of risk factors** is recommended to reduce stroke risk.
2b	In adults with silent cerebral infarcts who do not have an indication for statin therapy, use of low-dose **statin therapy** might be considered to reduce the risk of ischemic stroke.
2b	In adults with silent cerebral infarcts, the benefit of **antiplatelet therapy** to reduce the risk of ischemic stroke is uncertain.

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Atherosclerotic and Non-Atherosclerotic Risk Factors: Migraine

Linking Migraine to Stroke:

- An association between migraine, particularly migraine with aura, and stroke risk has been consistently identified in observational studies.
- This association is stronger for ischemic stroke than for hemorrhagic stroke and is more evident in young women.
- Vascular risk factors are common in patients with migraine and contribute to excess stroke risk.
- Use of combined hormonal contraception in those with migraine with aura is associated with increased risk for ischemic stroke.

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Atherosclerotic and Non-Atherosclerotic Risk Factors: Migraine

COR	RECOMMENDATIONS
1	In adults aged 18-64 years with migraine with or without aura, evaluation and modification of vascular risk factors is recommended, to address the elevated risk of stroke.
1	In adults with migraine with aura who desire contraception, progestin-only or non-hormonal forms are recommended to avoid the increased risk of ischemic stroke associated with combined hormonal contraception.

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Stroke Prevention in Children with Sickle Cell Disease Ages 2-16

Screening Intervention

COR	RECOMMENDATIONS
1	TCD screening frequency based on the highest mean flow velocity in the terminal portion of the internal carotid, or the proximal portion of the middle cerebral artery is recommended.

Brain MRI without Sedation

COR	RECOMMENDATIONS
2a	Should be performed as soon as possible in children and young adults with SCD and Beta-Thalassemia to evaluate for SCI and determine the need for chronic transfusions for stroke prevention.

Abbreviations: SCD indicates sickle cell disease; SCI, silent cerebral infarcts/infarction; and TCD, transcranial Doppler.

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Stroke Prevention in Children with Sickle Cell Disease Ages 2-16

Other Interventions	
COR	**RECOMMENDATIONS**
1	If considered at high risk based on TCD measurements, regularly scheduled transfusion therapy is effective for reducing stroke risk.
2a	If TCD velocities revert to normal, continued transfusion therapy can be beneficial to reduce the stroke risk.
2a	If mean flow velocities normalize and no intracranial stenosis is present, transitioning from transfusion to hydroxyurea therapy can be considered for stroke prevention.
2b	If stroke risk for stroke is high without intracranial stenosis and transfusion therapy is contraindicated, then hydroxyurea or bone marrow transplantation may be reasonable for stroke prevention.

Abbreviations: TCD indicates transcranial doppler.

American Heart Association.

Genetic Stroke Syndromes

COR	RECOMMENDATIONS
1	In patients with CADASIL, counseling on smoking cessation and treatment of hypertension and other vascular risk factors is beneficial to reduce the risk of incident stroke.
2a	In adults with hereditary hemorrhagic telangiectasia, screening for pulmonary arteriovenous malformations is reasonable to identify the need for multidisciplinary evaluation to manage stroke risk
2b	In patients with Fabry disease, the effectiveness of enzyme replacement therapy to reduce the risk of stroke is not well established.

Abbreviations: CADASIL indicates Cerebral Autosomal Dominant Arteriopathy with Subcortical Infarcts and Leukoencephalopathy.

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Inflammation in Atherosclerosis

COR	RECOMMENDATIONS
2b	In adults with a recent MI, the addition of low dose colchicine to intensive statin therapy might be reasonable to decrease the risk of ischemic stroke

Abbreviations: CAD indicates coronary artery disease; and MI, myocardial infarction.

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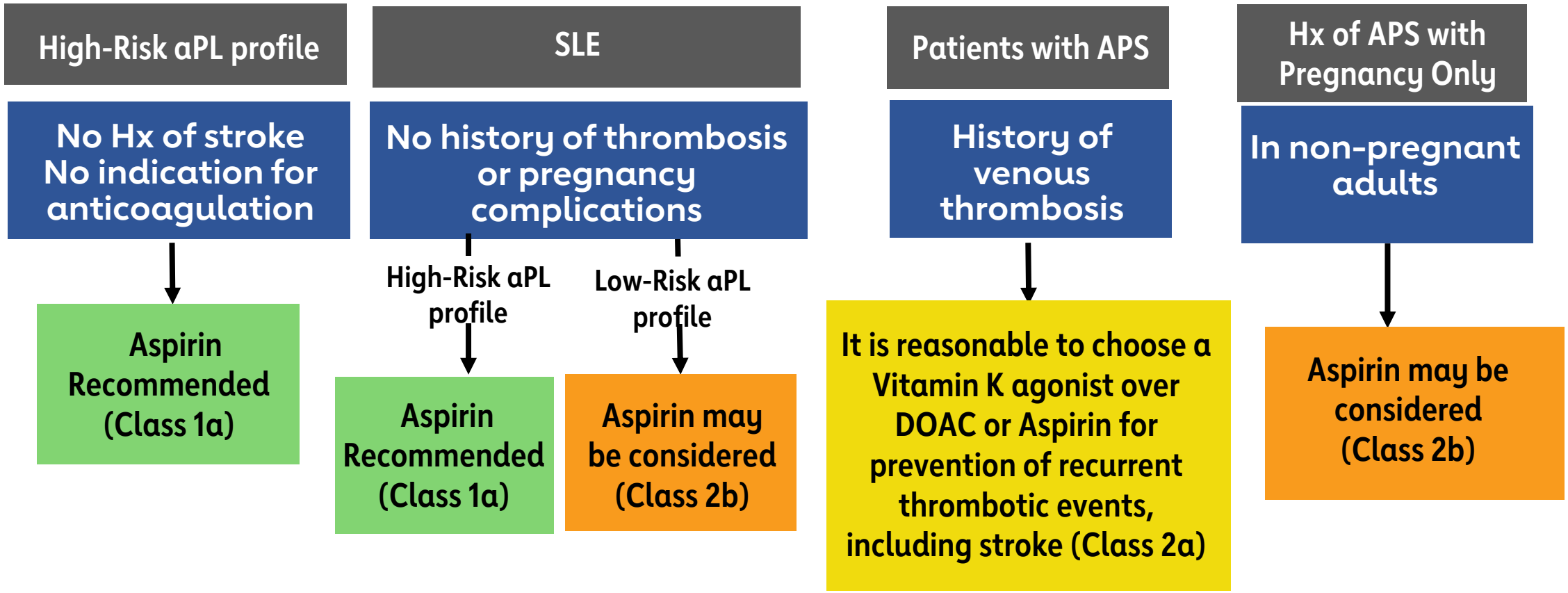
Stroke Prevention in Autoimmune Disorders: Antiphospholipid Syndrome (APS) and Systemic Lupus Erythematosus (SLE)


High-Risk aPL profile
No Hx of stroke
No indication for anticoagulation
Aspirin Recommended (Class 1a)
SLE
No history of thrombosis or pregnancy complications
High-Risk aPL profile
Aspirin Recommended (Class 1a)
Low-Risk aPL profile
Aspirin may be considered (Class 2b)
Patients with APS
History of venous thrombosis
It is reasonable to choose a Vitamin K agonist over DOAC or Aspirin for prevention of recurrent thrombotic events, including stroke (Class 2a)
Hx of APS with Pregnancy Only
In non-pregnant adults
Aspirin may be considered (Class 2b)

Abbreviations: aPL indicates antiphospholipid antibodies; APS, autoimmune condition characterized by the presence of venous or arterial thrombosis and/or pregnancy-related complications in patients with antiphospholipid antibodies; DOAC, direct oral anticoagulant; Hx, history; and SLE, systemic lupus arthritis.

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Stroke Prevention in Autoimmune Disorders: Rheumatoid Arthritis

Patients with rheumatoid arthritis
Statin treatment may be reasonable for stroke prevention (Class 2b)

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Stroke Prevention Related to Infections

COR	RECOMMENDATIONS
2a	In patients with periodontal disease, good oral hygiene and regular dental care can be beneficial to lower stroke risk.
3: No Benefit	In patients hospitalized with COVID-19, treatment with full-dose anticoagulation is not recommended to prevent stroke.

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Stroke Prevention in Substance Use Disorders

COR	RECOMMENDATIONS
1	In all adults, screening for substance misuse and substance use disorders is recommended to inform stroke risk.
2a	In patients who use recreational drugs or misuse alcohol or prescription medications or have a substance use disorder, counseling to stop, or appropriate substance use disorder treatments as appropriate is reasonable to reduce stroke risk.

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Prevention of Pregnancy-Associated Stroke

In pregnant or early postpartum (within 6 weeks of delivery) patients with severe hypertension, BP-lowering treatment to a target <160/110 mmHg as soon as possible is recommended to reduce the risk of fatal maternal ICH. (Class 1)

In patients with hypertensive disorders of pregnancy, including chronic hypertension in pregnancy, treatment with antihypertensive medication to a goal BP of <140/90 mmHg is reasonable to reduce the risk of pregnancy-associated stroke. (Class 2a)

Abbreviations: BP indicates Blood Pressure; and ICH, Intracranial Hemorrhage.

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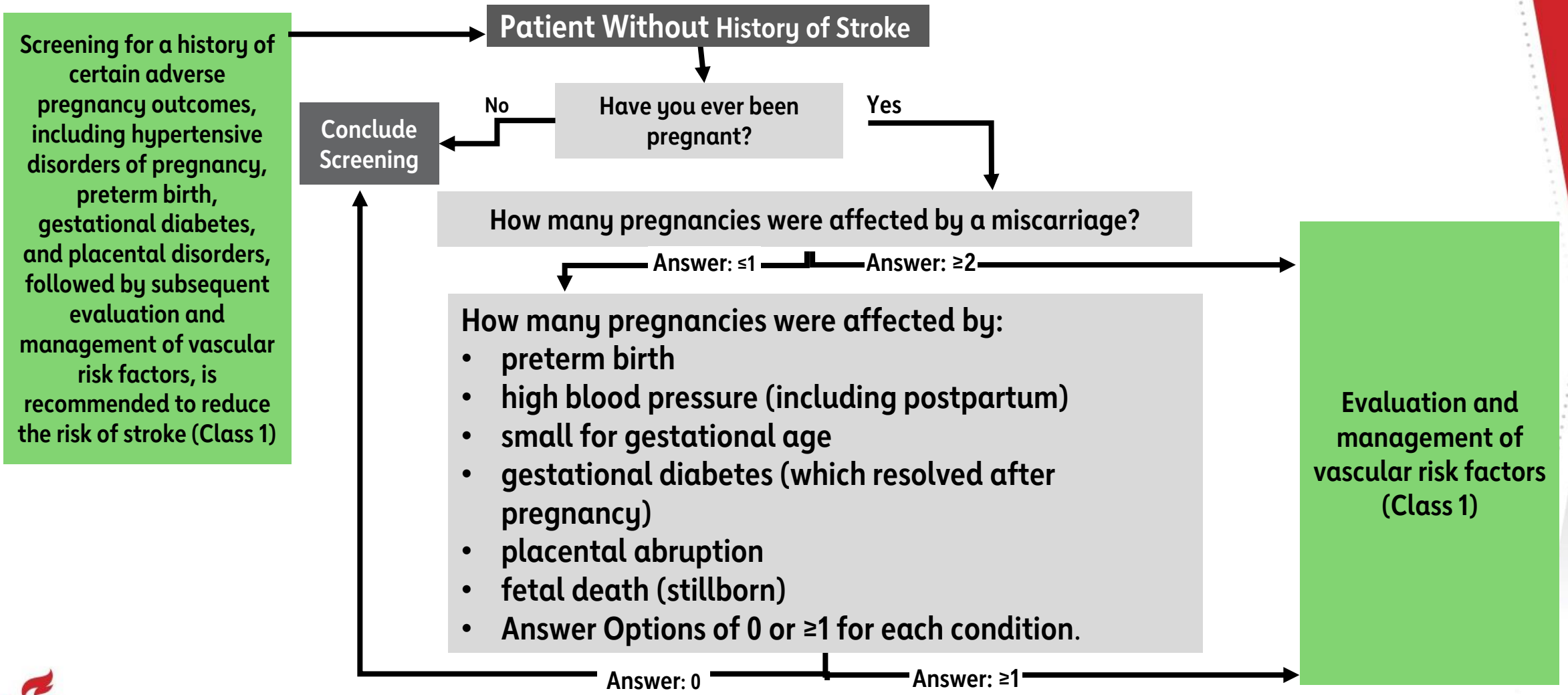
Prevention of Stroke in Women at Increased Risk because of Pregnancy Events


Screening for a history of certain adverse pregnancy outcomes, including hypertensive disorders of pregnancy, preterm birth, gestational diabetes, and placental disorders, followed by subsequent evaluation and management of vascular risk factors, is recommended to reduce the risk of stroke (Class 1)
Patient Without History of Stroke
Have you ever been pregnant?
No
Conclude Screening
Yes
How many pregnancies were affected by a miscarriage?
Answer: ≤1
Answer: ≥2
How many pregnancies were affected by:
• preterm birth
• high blood pressure (including postpartum)
• small for gestational age
• gestational diabetes (which resolved after pregnancy)
• placental abruption
• fetal death (stillborn)
• Answer Options of 0 or ≥1 for each condition.
Answer: 0
Answer: ≥1
Evaluation and management of vascular risk factors (Class 1)

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Endometriosis Increases the Risk of Future Stroke

Positive History of Endometriosis increases the risk of:

- Stroke
- Hypertension
- Hypercholesterolemia
- Inflammation
- Cardiovascular Disease

COR	RECOMMENDATIONS
2a	Screening for Endometriosis history is reasonable to inform the risk of stroke
2a	**POSITIVE HISTORY** Vascular risk factor evaluation and modification of vascular risk factors are reasonable to reduce stroke risk.

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Stroke Risk with Hormonal Contraception

Patient considering combined hormonal contraception?

↓

Lower doses of ethinyl estradiol are recommended to minimize potential increased stroke risk (Class 1)

In individuals with specific stroke risk factors considering contraception*

↓

Shared decision making is recommended to determine best choice to balance stroke risk from contraception vs. stroke risk with pregnancy (Class 1)

↓

Progestin only or non-hormonal contraception is reasonable to prevent the increased risk of stroke (Class 2a)

* i.e., age >35 years, tobacco use, hypertension, or migraine with aura

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Menopause Associated Stroke Risk Reduction

COR	RECOMMENDATIONS
1	Screening for a history of premature ovarian failure or premature early menopause can be beneficial to inform stroke risk.
1	In patients with premature ovarian failure or early menopause, evaluation and modification of vascular risk factors is recommended to reduce elevated stroke risk.
3: Harm	In women aged 60 years or older, or more than 10 years post-natural-menopause, or at elevated risk for CVD or stroke, oral estrogen-containing menopausal hormone therapy is associated with an excess risk of stroke and must be weighed against clinical benefits.

Abbreviations: MHT indicates menopausal hormonal treatment.

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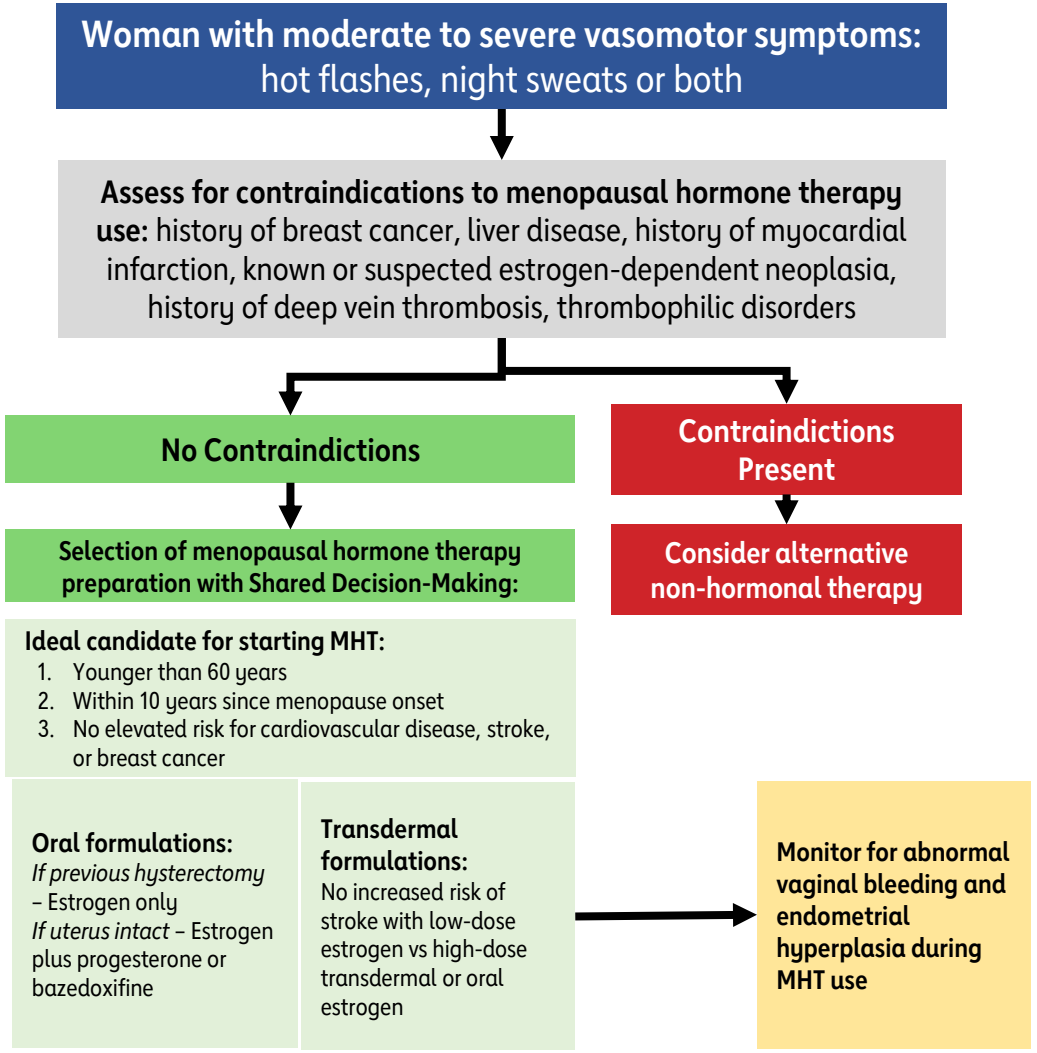
Menopause Associated Stroke Risk Reduction


Woman with moderate to severe vasomotor symptoms: hot flashes, night sweats or both
Assess for contraindications to menopausal hormone therapy use: history of breast cancer, liver disease, history of myocardial infarction, known or suspected estrogen-dependent neoplasia, history of deep vein thrombosis, thrombophilic disorders
No Contraindictions
Contraindictions Present
Selection of menopausal hormone therapy preparation with Shared Decision-Making:
Consider alternative non-hormonal therapy
Ideal candidate for starting MHT:
1. Younger than 60 years
2. Within 10 years since menopause onset
3. No elevated risk for cardiovascular disease, stroke, or breast cancer
Oral formulations:
If previous hysterectomy – Estrogen only
If uterus intact – Estrogen plus progesterone or bazedoxifine
Transdermal formulations:
No increased risk of stroke with low-dose estrogen vs high-dose transdermal or oral estrogen
Monitor for abnormal vaginal bleeding and endometrial hyperplasia during MHT use

Abbreviations: MHT indicates menopausal hormonal treatment.

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Hormone use and Stroke Risk Reduction

COR	RECOMMENDATIONS
2a	In transgender women and gender-diverse individuals taking estrogens for gender affirmation, evaluation and modification of risk factors can be beneficial to reduce stroke risk.
2a	In men aged 45-80 with confirmed hypogonadism who are considering testosterone therapy, initiation or continuation of testosterone replacement therapy is reasonable and does not increase stroke risk.

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Cardiomyopathy and Stroke Risk Reduction

Anticoagulation Use for Primary Prevention of Stroke in Cardiomyopathy	
COR	**RECOMMENDATIONS**
3: No Benefit	In patients with left ventricular systolic dysfunction and no evidence of AF or left ventricular thrombus, anticoagulation is not indicated to prevent stroke and is associated with a higher bleeding risk.

Abbreviations: AF indicates atrial fibrillation.

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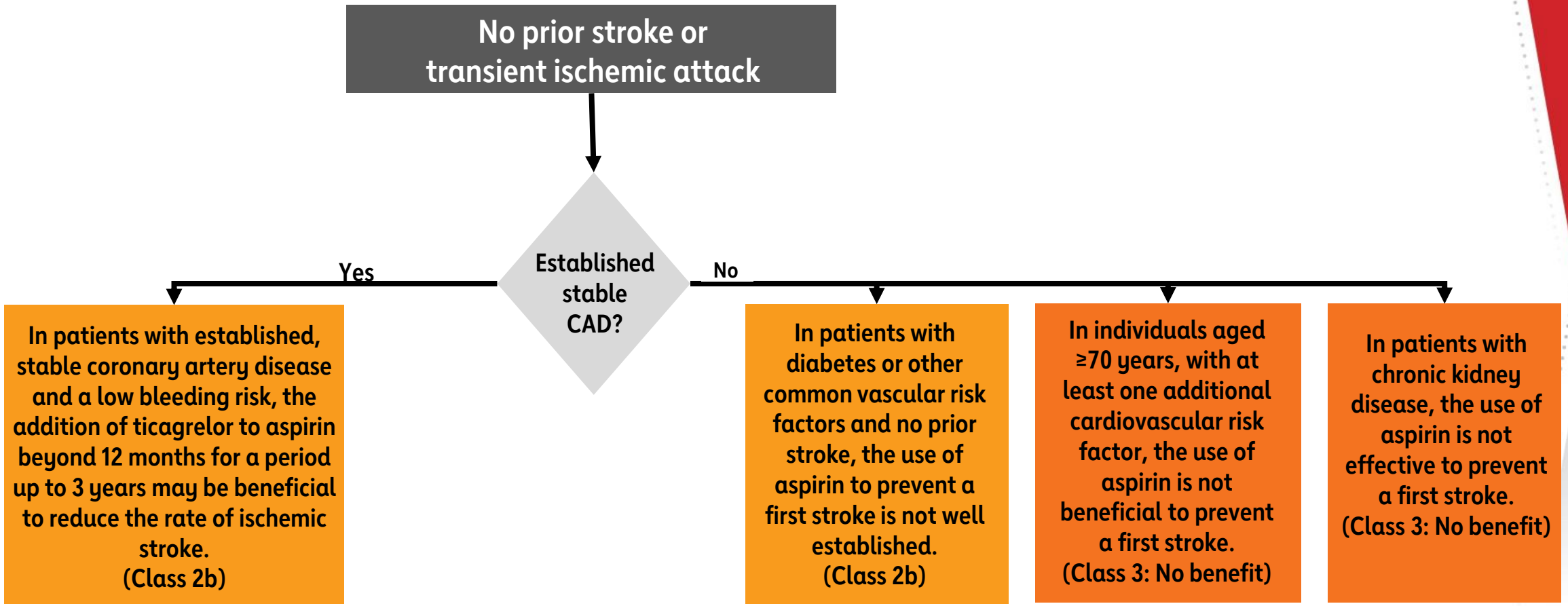
Antiplatelet Use for Primary Prevention of Stroke


No prior stroke or transient ischemic attack
Established stable CAD?
Yes
No
In patients with established, stable coronary artery disease and a low bleeding risk, the addition of ticagrelor to aspirin beyond 12 months for a period up to 3 years may be beneficial to reduce the rate of ischemic stroke. (Class 2b)
In patients with diabetes or other common vascular risk factors and no prior stroke, the use of aspirin to prevent a first stroke is not well established. (Class 2b)
In individuals aged ≥70 years, with at least one additional cardiovascular risk factor, the use of aspirin is not beneficial to prevent a first stroke. (Class 3: No benefit)
In patients with chronic kidney disease, the use of aspirin is not effective to prevent a first stroke. (Class 3: No benefit)

Abbreviations: CAD indicates coronary artery disease.

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Acknowledgments

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